CLAIMS

1. A heating-type balloon catheter device having a heating-type balloon at a top end portion of a catheter main body and a vibration imparting device connected to a base end portion of the catheter main body and disposed to impart vibration to a liquid for heating in the heating-type balloon through a liquid for heating filled in the catheter main body; said vibration imparting device comprising:

an elastic tube with a base end portion thereof connected to said catheter main body and with a top end portion thereof closed, said elastic tube being filled with a liquid for heating; and

a vibrator device having a roller rotating about a rotary shaft at a position offset to the rotary shaft and set to the elastic tube;

wherein said elastic tube is set to said vibrator device in such a manner that a predetermined direction of rotation of said roller extends from the side of the base end portion of said elastic tube to the side of the top end portion thereof and a margin volume part which is not pressed with said roller is provided on the side of the top end portion of said elastic tube; and

wherein said elastic tube is disposed to assume a shutt-off state and a communication state in accordance with rotation of said roller in its predetermined direction, the shutt-off state being a state in which the base end portion side of said elastic tube and the top end portion side thereof are blocked by pressing said elastic tube with the roller and reducing a radial size of said elastic tube with the roller and the communication state being a state in which the base end portion side of said elastic tube is communicated with the top end portion side thereof by enlarging and recovering the size of said elastic tube due to elasticity by releasing the pressing of said elastic tube with the roller; and

wherein the heating liquid in said elastic tube is supplied with

pressure toward said margin volume part when said elastic tube is in the shutt-off state while the heating liquid pressurized in said margin volume part is flown backward toward the base end portion side of said elastic tube when said elastic tube is in the communication state, in accordance with rotation of the roller in the predetermined direction of rotation of the roller.

2. The heating-type balloon catheter device as claimed in claim 1, wherein said elastic tube is connected to the base end portion of said catheter main body through an extension tube which is superior in rigidity and unlikely to be deformed by expansion and constriction in a radial direction thereof.

3. The heating-type balloon catheter device as claimed in claim 1, wherein:

a connecter having plural branch passages is fitted to the base end portion of said catheter main body; and

said elastic tube is connected to a predetermined branch passage for supplying a contrast agent, among the plural branch passages.

4. The heating-type balloon catheter device as claimed in claim 3, wherein:

said elastic tube is connected to the predetermined branch passage through a shift valve; and

said shift valve is set to assume a first shift position for supplying the catheter main body with a contrast agent by blocking a communication between said elastic tube and said catheter main body and a second shift position for communicating said elastic tube with said catheter main body.

5. The heating-type balloon catheter device as claimed in claim 1, wherein an indicator is provided on an outer peripheral surface of said elastic tube, which indicates a size of said margin volume part to be set in accordance with a size of said balloon.

6. The heating-type balloon catheter device as claimed in claim 5,

wherein said indicator is set on the basis of a predetermined position of a housing of said vibrator device.

7. The heating-type balloon catheter device as claimed in claim 6, wherein:

the predetermined position of the housing is set to a position which is located on an orifice edge surface on an oulet side of the housing or in the vicinity thereof and which is readily visible from outside, and

said indicator is formed in plural numbers at spaced intervals in an area extending from the top end portion side of said elastic tube to the base end portion side thereof.

8. The heating-type balloon catheter device as claimed in claim 1, wherein at least one air vent valve for withdrawing air in a predetermined path is disposed on the predetermined path extending from the base end portion of said catheter main body to the top end portion of said elastic tube.

9. The heating-type balloon catheter device as claimed in claim 8, wherein said air vent valve is connected to the top end of said elastic tube.

10. The heating-type balloon catheter device as claimed in claim 8, wherein said air vent valve comprises a first air vent valve connected to a path extending from said catheter main body to said elastic tube and a second air vent valve connected to the top end of said elastic tube.

11. An elastic tube device comprising an elastic tube which is expanded or constricted in such a manner that tube walls of said elastic tube opposite to each other are caused to be closely attached to each other in a radial direction upon application of external force toward a direction in which the elastic tube is closed and that they are allowed to recover to its original size due to its own elasticity when the external force is released;

wherein said elastic tube has the top end closed and the base end portion constituting a connection part to a catheter main body; and

wherein a plurality of indicators are disposed on an outer peripheral surface of said elastic tube at a spaced interval in a longitudinal direction of the elastic tube, said indicators corresponding to a size of a balloon in a heating-type balloon catheter device .

12. The elastic tube device as claimed in claim 11, wherein said indicators are formed from the top end portion side of said elastic tube to the base end portion side thereof.

13. The elastic tube device as claimed in claim 11, wherein an air vent valve for selectively opening said elastic tube to the atmosphere is connected to either one of the top end and the base end of said elastic tube.

14. The elastic tube device as claimed in claim 11, wherein an air vent valve for selectively opening said elastic tube to the atmosphere is connected each to the top end portion of said elastic tube and the base end portion thereof.

15. A vibrator device comprising:

a housing;

a rotary shaft held pivotally to the housing;

a guide surface formed in an arc shape about said rotary shaft on an inner peripheral surface of said housing in a manner as winding said rotary shaft; and

a roller for pressing an elastic tube in cooperation with the guide surface, which rotates about said rotary shaft at a position offset from said rotary shaft;

wherein a number and/or disposition of said roller are/is disposed to assume a state in which the roller is not opposite to the guide surface and does not press said elastic tube as the rotary shaft makes a full revolution.

16. The vibrator device as claimed in claim 15, wherein:

said roller comprises only one roller; and

a length of said guide surface is set to be at an angle in the range of approximately 180 degree about said rotary shaft.

17. The vibrator device as claimed in claim 15, wherein:

said roller comprises two rollers disposed at an interval of 180 degree about said rotary shaft; and

said guide surface is set to be at an angle in the range of approximately 60 degree about said rotary shaft.

18. The vibrator device as claimed in claim 15, wherein:

said roller comprises a front roller disposed at a position on the advance side in a predetermined direction of rotation about said rotary shaft and a rear roller disposed at a position on the delay side in the predetermined direction of rotation;

the front roller and the rear roller are disposed in positions each in the proximity to a direction of rotation of said rotary shaft and they are disposed to assume a position at which each of the front and rear rollers is opposite to the guide surface and a position at which each of them is not opposite to the guide surface, as the rotary shaft makes a full revolution in the predetermined direction of rotation thereof; and

a spaced distance between said front and rear rollers is set to become somewhat larger than a spaced distance between said front roller and said guide surface as said front roller and said rear roller are opposite to the guide surface.